

# A Model of Pediatric End-Stage Lung Failure in Small Lambs <20 kg

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## Abstract

One in five children with end-stage lung failure (ESLF) die while awaiting lung transplant. No suitable animal model of ESLF exists for the development of artificial lung devices for bridging to transplant. Small lambs weighing 15.7 +/- 3.1 kg (n = 5) underwent ligation of the left anterior pulmonary artery (PA) branch, and gradual occlusion of the right main PA over 48 hours. All animals remained hemodynamically stable. Over seven days of disease model conditions, they developed pulmonary hypertension (mean PA pressure 20 +/- 5 vs. 33 +/- 4 mm Hg), decreased perfusion (SvO<sub>2</sub>) 66 +/- 3 vs. 55 +/- 8%) with supplemental oxygen requirement, and severe tachypneic response (45 +/- 9 vs. 82 +/- 23 breaths/min) (all p < 0.05). Severe right heart dysfunction developed (tricuspid annular plane systolic excursion 13 +/- 3 vs. 7 +/- 2 mm, fractional area change 36 +/- 6 vs. 22 +/- 10 mm, ejection fraction 51 +/- 9 vs. 27 +/- 17%, all p < 0.05) with severe tricuspid regurgitation and balloon-shaped dilation of the right ventricle. This model of pediatric ESLF reliably produces pulmonary hypertension, right heart strain, and impaired gas exchange, and will be used to develop a pediatric artificial lung.

## Palabras clave

**Palabras clave de autor:** [pediatric](#); [lung failure](#); [transplant](#); [bridge to transplant](#); [animal model](#); [ovine](#); [disease model](#); [pulmonary hypertension](#); [right heart failure](#); [echocardiography](#)

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